

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method executed in a computer ~~system~~ apparatus for producing a combined ~~system~~ set of partial differential equations comprising:

representing ~~each~~ at least one of a plurality of systems as two or more selected application modes modeling physical quantities of said ~~each system~~ one of said plurality of systems;

determining ~~a representation of a set of partial differential equation equations~~ system for each of the two or more selected application modes corresponding to said one of said plurality of systems; ~~and~~

forming said combined ~~system~~ set of partial differential equations using the determined sets of partial differential equation equations ~~systems~~ associated with said one of said plurality of systems; ~~and~~

outputting a model based on said combined set of partial differential equations for the two or more selected application modes for the said one of said plurality of systems.

2. (Cancelled).

3. (Currently Amended) The method of Claim 1, further comprising:

representing at least one of said physical quantities of a first of said plurality of application modes using at least one dependent variable in said set of partial differential equations ~~equation system~~ corresponding to said first of said plurality of application ~~mode~~ modes.

4. (Original) The method of Claim 3, further comprising:

representing said at least one of said physical quantities directly as said at least one dependent variable.

5. (Original) The method of Claim 4, further comprising:

representing said at least one of said physical quantities using a relation between said at least one dependent variable and another variable representing said at least one physical quantity.

6. (Original) The method of Claim 5, wherein said at least one of said physical quantities is represented using at least one of: a numerical value and a mathematical expression.

7. (Original) The method of Claim 6, further comprising:  
forming said mathematical expression including at least one of: a space coordinate, a time coordinate, a numerical value, and an actual physical quantity.

8. (Original) The method of Claim 1, further comprising:  
associating at least one subdomain with each application mode.

9. (Original) The method of Claim 8, wherein each of said physical quantity is described by at least one physical property, and the method further comprising:  
disabling at least one physical quantity and associated variables in a subdomain.

10. (Previously Presented) The method of Claim 1, further comprising:  
displaying a partial differential equation in one of a: coefficient view and a general form corresponding to a representation of said partial differential equation; and  
modifying a portion of said partial differential equation.

11. (Original) The method of Claim 10, further comprising: modifying at least one boundary condition of said partial differential equation.

12. (Original) The method of Claim 10, further comprising:  
modifying at least one coefficient of said partial differential equation.

13. (Currently Amended) The method of Claim 10, further comprising:  
obtaining data using a graphical user interface in connection with said one of said plurality of systems.

14. (Original) The method of Claim 10, further comprising:

using a graphical user interface to display and input data.

15. (Currently Amended) The method of Claim 1, further comprising:  
solving said combined system of partial differential equations using a coefficient form of said combined ~~system~~ set of partial differential equations.

16. (Currently Amended) The method of Claim 1, further comprising:  
solving said combined ~~system~~ set of partial differential equations using a general form of said combined system of partial differential equations.

17. (Currently Amended) The method of Claim 16, further comprising:  
converting at least one set of partial differential ~~equations~~ equation ~~system~~ included in said combined ~~system~~ set of partial differential equations from coefficient to general form.

18. (Currently Amended) The method of Claim 17, further comprising:  
converting said combined ~~system~~ set of partial differential equations from coefficient to general form.

19. (Currently Amended) The method of Claim 18, further comprising:  
using linearization of a general form to solve for a non-linear ~~system~~ set of partial differential equations.

20. (Currently Amended) The method of Claim 19, further comprising:  
using a Newton method in solving for said non-linear ~~system~~ set of partial differential equations.

21. (Currently Amended) The method of Claim 1, further comprising:  
solving said combined ~~system~~ set of partial differential equations.

22. (Currently Amended) The method of Claim 21, wherein solving said combined ~~system~~ set further includes:

selecting a portion of physical quantities in said combined ~~system~~ set of partial differential equations;

solving for one or more variables associated with said portion of physical quantities.

23. (Original) The method of Claim 22, further comprising:

using values associated with physical quantities not included in said portion for specifying initial conditions.

24. (Currently Amended) The method of Claim 21, further comprising:

selecting a solver type specifying a particular technique used in solving said combined ~~system~~ set of partial differential equations.

25. (Original) The method of Claim 24, wherein said solver type uses a finite

element method.

26. (Currently Amended) The method of Claim 1, further comprising:

using a graphical user interface in connection with input data;

storing said input data in a representation in a data structure stored in a memory of the computer system; and

converting said input data into an intermediate form wherein said intermediate form for each ~~system~~ set of partial differential equations associated with said one of said plurality of systems is used in forming said combined ~~system~~ set.

27. (Currently Amended) The method of Claim 1, further comprising:

determining a submode setting associated with one of the sets of partial differential equations ~~equation-systems~~ associated with said one of said plurality of systems; and

determining a number of variables included in said one set of partial differential equations ~~equation-system~~ in accordance with said submode setting and a type of a corresponding application mode.

28. (Original) The method of Claim 27, wherein said submode is one of stationary, time dependent, linear, non-linear, scalar and multi-component.

29. (Original) The method of Claim 1, further comprising:  
selecting at least one application mode.

30. (Original) The method of Claim 29, wherein said at least one application mode is one of predefined and user defined.

31. (Original) The method of Claim 30, further comprising:  
modifying a set of routines associated with a predefined application mode to be used in connection with a user defined application mode.

32. (Currently Amended) The method of Claim 1, wherein said one of said plurality systems being modeled is a one-dimensional geometry model.

33. (Currently Amended) The method of Claim 1, wherein said one of said plurality systems being modeled is a two-dimensional geometry model.

34. (Currently Amended) The method of Claim 1, wherein said one of said plurality of systems being modeled is a three-dimensional geometry model.

35. (Original) The method of Claim 31, further comprising:  
defining a user-defined application mode.

36. (Original) The method of Claim 35, wherein said defining a user-defined application mode further comprises:

defining an object class corresponding to said user-defined application mode; and

defining a first portion of methods included in said object class using functionality that is inherited from other classes.

37. (Original) The method of Claim 36, further comprising:

overloading a second portion of methods to provide alternative functionality.

38. (Original) The method of Claim 37, further comprising:  
using overloading in connection with at least one method to disable functionality of said at least one method.

39. (Original) The method of Claim 31, further comprising:  
defining an application that is a subclass of an existing class corresponding to functionality of an application mode.

40. (Original) The method of Claim 39, wherein said application mode is user-defined.

41. (Original) The method of Claim 39, wherein said application mode is predefined.

42. (Currently Amended) A computer ~~program product~~ readable medium having stored thereon instructions for producing a combined ~~system set~~ of partial differential equations comprising machine executable code which when executed by at least one processor, causes the processor to perform steps comprising:

~~machine-executable code for~~ representing ~~each~~ at least one of a plurality of systems as two or more selected application modes modeling physical quantities of said ~~each system~~ one of said plurality of systems;

~~machine-executable code for~~ determining a ~~representation of a set of~~ partial differential equations ~~equation system~~ for each of the two or more selected application modes corresponding to said one of said plurality of systems; ~~and~~

~~machine-executable code for~~ forming said combined ~~system set~~ of partial differential equations using sets of partial differential equations ~~equation system~~ associated with said one of said plurality of systems; ~~and~~

outputting a model based on said combined set of partial differential equations for the two or more selected application modes for the said one of said plurality of systems.

43. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for~~ representing at least one of said physical quantities of a first of said plurality of application modes using at least one dependent variable in said set of partial differential equations ~~equation-system~~ corresponding to said first of said application ~~mode~~ modes.

44. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 43, further comprising:

~~machine-executable code for~~ representing said at least one of said physical quantities directly as said at least one dependent variable.

45. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 44, further comprising:

~~machine-executable code for~~ representing said at least one of said physical quantities using a relation between said at least one dependent variable and another variable representing said at least one physical quantity.

46. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 45, wherein said at least one of said physical quantities is represented using at least one of: a numerical value and a mathematical expression.

47. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 46, further comprising:

~~machine-executable code for~~ forming said mathematical expression including at least one of: a space coordinate, a time coordinate, a numerical value, and an actual physical quantity.

48. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for~~ associating at least one subdomain with each application mode.

49. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 48, wherein each of said physical quantity is described by at least one physical property, and the computer ~~program-product~~ readable medium further comprises:

~~machine-executable code for~~ disabling at least one physical quantity and associated variables for a portion of a subdomain.

50. (Previously Presented) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for~~ displaying a partial differential equation in one of a: coefficient view and a general form corresponding to a representation of said partial differential equation; and

~~machine-executable code for~~ modifying a portion of said partial differential equation.

51. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 50, further comprising:

~~machine-executable code for~~ modifying at least one boundary condition of said partial differential equation.

52. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 50, further comprising:

~~machine-executable code for~~ modifying at least one coefficient of said partial differential equation.

53. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 50, further comprising:

~~machine-executable code for~~ obtaining data using a graphical user interface in connection with said one of said plurality of systems.

54. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 50, further comprising:

~~machine-executable code for~~ using a graphical user interface to display and input data.

55. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for~~ solving said combined ~~system~~ set of partial differential equations using a coefficient form of said combined ~~system~~ set of partial differential equations.

56. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for~~ solving said combined ~~system~~ set of partial differential equations using a general form of said combined ~~system~~ set of partial differential equations.

57. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 56, further comprising:

~~machine-executable code for~~ converting at least one set of partial differential equations ~~equation-system~~ included in said combined ~~system~~ set of partial differential equations from coefficient to general form.

58. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 57, further comprising:

~~machine-executable code for~~ converting said combined ~~system~~ set of partial differential equations from coefficient to general form.

59. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 58, further comprising:

~~machine-executable code for~~ using linearization of a general form to solve for a non-linear system of partial differential equations.

60. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 59, further comprising:

~~machine-executable code for~~ using a Newton method in solving for said non-linear system of partial differential equations.

61. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for solving said combined system set~~ of partial differential equations.

62. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 61, wherein said ~~machine-executable code for solving said combined system set~~ further includes:

~~machine-executable code for selecting a portion of physical quantities in said combined system set of partial differential equations; and~~

~~machine-executable code for solving for one or more variables associated with said portion of variables.~~

63. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 62, further comprising:

~~machine-executable code for using values associated with physical quantities not included in said portion for specifying initial conditions.~~

64. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 61, further comprising:

~~machine-executable code for selecting a solver type specifying a particular technique used in solving said combined system set of partial differential equations.~~

65. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 64, wherein said solver type includes ~~machine-executable code for solving a system of partial differential equations using a finite element method.~~

66. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for using a graphical user interface in connection with input data;~~

~~machine-executable code for~~ storing said input data in a representation in a data structure stored in a memory of the computer system; and

~~machine-executable code for~~ converting said input data into an intermediate form wherein said intermediate form for each ~~set system~~ of partial differential equations associated with said one of said plurality of systems is used in forming said combined ~~system set~~.

67. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for~~ determining a submode setting associated with one of the sets of partial differential equations ~~equation-systems~~ associated with said one of said plurality of systems; and

~~machine-executable code for~~ determining a number of variables included in said one set of partial differential equations ~~equation-system~~ in accordance with said submode setting and a type of a corresponding application mode.

68. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 67, wherein said submode is one of stationary, time dependent, linear, non-linear, scalar and multi-component.

69. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for~~ selecting at least one application mode.

70. (Currently Amended) The ~~method~~ computer readable medium of Claim 69, wherein said at least one application mode is one of predefined and user defined.

71. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 70, further comprising:

~~machine-executable code for~~ defining a user defined application mode;  
and

~~machine-executable code~~ for modifying a set of routines associated with a predefined application mode to be used in connection with a user defined application mode.

72. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, wherein said one of said plurality systems being modeled is a one-dimensional geometry model.

73. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, wherein said one of said plurality systems being modeled is a two-dimensional geometry model.

74. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, wherein said one of said plurality of systems being modeled is a three-dimensional geometry model.

75. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

defining a user-defined application mode.

76. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 75, wherein said machine executable code for defining a user-defined application mode further comprises:

~~machine-executable code~~ for defining an object class corresponding to said user-defined application mode; and

~~machine-executable code~~ for defining a first portion of methods included in said object class using functionality that is inherited from other classes.

77. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 76, further comprising:

~~machine-executable code~~ for overloading a second portion of methods to provide alternative functionality.

78. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 77, further comprising:

~~machine-executable code for~~ using overloading in connection with at least one method to disable functionality of said at least one method.

79. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 42, further comprising:

~~machine-executable code for~~ defining an application that is a subclass of an existing class corresponding to functionality of an application mode.

80. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 79, wherein said application mode is user-defined.

81. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 79, wherein said application mode is predefined.

82. (Currently Amended) A method executed in a computer ~~system~~ apparatus for solving a ~~system~~ set of partial differential equations comprising:

defining a plurality of user-defined application modes modeling physical quantities of an associated model;

selecting two or more of the user-defined application modes; ~~and~~

determining ~~a representation of said sets of~~ partial differential equations ~~equation system~~ for said selected two or more user-defined application modes of said associated model; and

outputting a model based on a combination of the determined sets of partial differential equations for the two or more selected user-defined application modes for the associated model.

83. (Currently Amended) The method of Claim 82, further comprising:

solving for said set of partial differential equation ~~system~~ using a finite element method.

84. (Original) The method of Claim 82, wherein said user-defined application mode is one of: a one-dimensional model, a two-dimensional model and a three-dimensional model.

85. (Original) The method of Claim 84, wherein said defining a user-defined application mode further comprises:

defining an object class corresponding to said user-defined application mode; and

defining a first portion of methods included in said object class using functionality that is inherited from other classes.

86. (Original) The method of Claim 85, further comprising:

overloading a second portion of methods to provide alternative functionality.

87. (Original) The method of Claim 86, further comprising:

using overloading in connection with at least one method to disable functionality of said at least one method.

88. (Cancelled).

89. (Original) The method of Claim 82, further comprising:

defining at least one user-defined application that is a subclass of an existing class associated with an application mode.

90. (Original) The method of Claim 89, wherein said application mode associated with said existing class is user-defined.

91. (Original) The method of Claim 89, wherein said application mode associated with said existing class is predefined.

92. (Currently Amended) A computer ~~program-product~~ readable medium having stored thereon instructions for solving a system of partial differential equations

comprising machine executable code which when executed by at least one processor, causes the processor to perform steps comprising:

~~machine-executable code for~~ defining a plurality of user-defined application modes modeling physical quantities of an associated model;

~~machine-executable code for~~ selecting two or more of the user-defined application modes; ~~and~~

~~machine-executable code for~~ determining a ~~representation of said sets~~ of partial differential equations ~~equation-system~~ for said selected two or more user-defined application modes of said associated model; and

outputting a model based on a combination of the determined sets of partial differential equations for the two or more selected user-defined application modes for the associated model.

93. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 92, further comprising:

~~machine-executable code for~~ solving for said set of partial differential equations ~~equation-system~~ using a finite element method.

94. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 92, wherein said user-defined application mode is one of: a one-dimensional model, a two-dimensional model and a three-dimensional model.

95. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 94, wherein said ~~machine-executable code for~~ defining a user-defined application mode further comprises:

~~machine-executable code for~~ defining an object class corresponding to said user-defined application mode; and

~~machine-executable code for~~ defining a first portion of methods included in said object class using functionality that is inherited from other classes.

96. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 95, further comprising:

~~machine-executable code for~~ overloading a second portion of methods to provide alternative functionality.

97. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 96, further comprising:

~~machine-executable code for~~ using overloading in connection with at least one method to disable functionality of said at least one method.

98. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 97, further comprising:

~~machine-executable code for~~ selecting a plurality of application modes associated with at least one of a plurality of systems, said user-defined application being one of said plurality of application modes selected; and

~~machine-executable code for~~ forming a combined ~~system~~ set of partial differential equations using sets of partial differential equations ~~equation-system~~ associated with said plurality of application modes.

99. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 92, further comprising:

~~machine-executable code for~~ defining at least one user-defined application that is a subclass of an existing class associated with an application mode.

100. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 99, wherein said application mode associated with said existing class is user-defined.

101. (Currently Amended) The computer ~~program-product~~ readable medium of Claim 99, wherein said application mode associated with said existing class is predefined.